

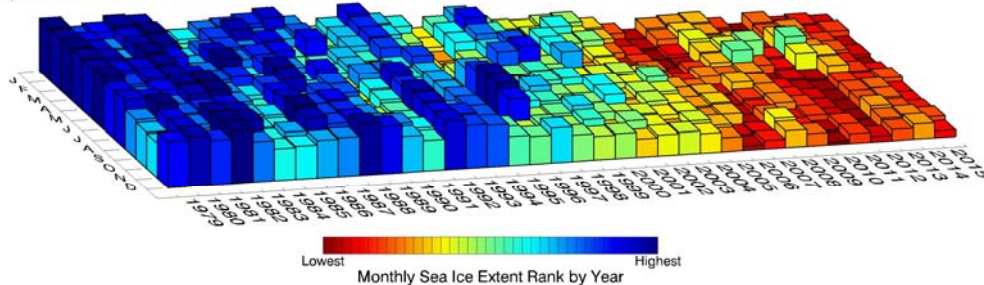


Dramatic Contrasts in Arctic vs Antarctic Sea Ice Trends in 3-D Visualizations and Compilations of Monthly Record Highs and Lows

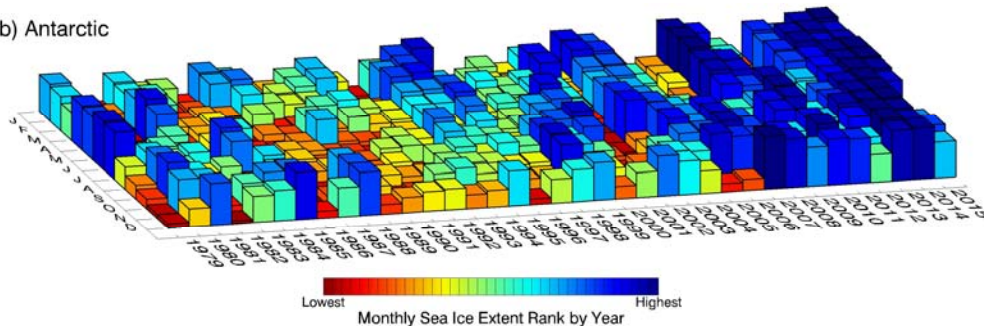
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3-D visualizations of the month-by-month rankings of Arctic and Antarctic sea ice extents

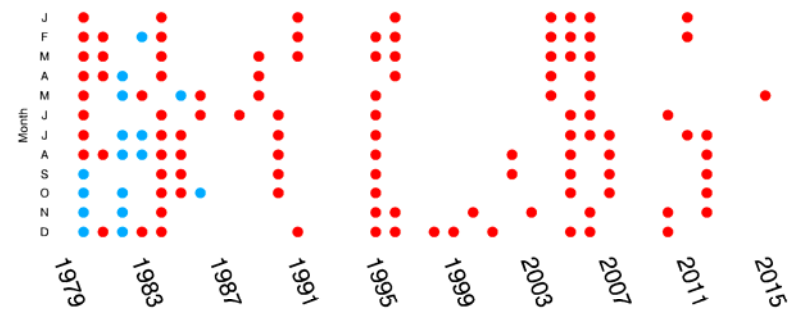
(a) Arctic



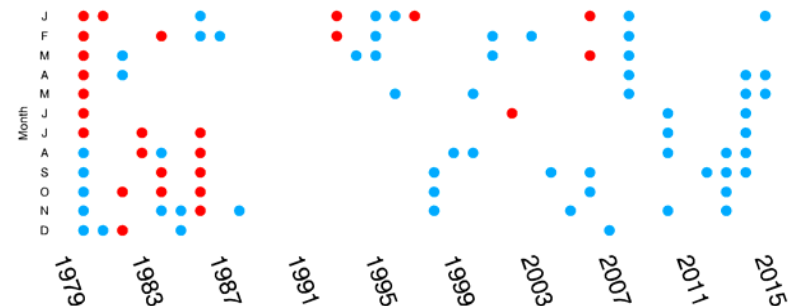
(b) Antarctic



(a) Arctic record highs (●) and lows (●)



(b) Antarctic record highs (●) and lows (●)



New visualizations dramatically display the decreases in Arctic sea ice coverage over the years 1979-2015, apparent in each month of the year, with not a single record high in ice extents occurring in any month since 1986, a time period with 75 monthly record lows. Results are less dramatic in the Antarctic, but intriguingly in the opposite direction, with only 6 record lows since 1986 and 45 record highs.





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Reference: Parkinson, C. L., and N. E. DiGirolamo, 2016: New visualizations highlight new information on the contrasting Arctic and Antarctic sea-ice trends since the late 1970s, *Remote Sensing of Environment*, 183, 198-204, doi:10.1016/j.rse.2016.05.020.

Data Sources: Satellite passive-microwave data from the Scanning Multichannel Microwave Radiometer (SMMR) on NASA's Nimbus 7 satellite and the Special Sensor Microwave Imager (SSM/I) and SSM/I Sounder (SSMIS) on satellites of the Defense Meteorological Satellite Program (DMSP).

Technical Description of Figures:

Graphic 1, 3-D Visualizations: These visualizations show for both polar regions the sea-ice-extent rankings by year for each month January–December over the 37-year period 1979-2015. For each month, the 37 years of data are ranked from rank 1 for the year with the lowest sea ice extent for that month to rank 37 for the year with the highest sea ice extent for that month; the rankings are color-coded from deep red for the lowest rank to deep blue for the highest rank. The results for the Arctic are particularly striking, with almost all the blues (high sea ice extents) in the first half of the record and almost all the reds (low sea ice extents) in the later part of the record. The Antarctic results are basically in the opposite direction, from low ranks predominantly in the early part of the record to high ranks more frequent in the later part of the record, although the upward flow for the Antarctic is not nearly as systematic as the downward flow for the Arctic.

Graphic 2, Record Highs and Lows: Using the satellite-derived rankings displayed in Graphic 1, the plots of Graphic 2 highlight for each month January–December every instance of a new (at the time) monthly record high ice extent (blue dots) and every instance of a new monthly record low ice extent (red dots).

Scientific Significance: Satellite data have revealed marked changes in Arctic and Antarctic sea ice extents since the late 1970s, contributing important information about how Earth's climate is changing. The changes in the Arctic have garnered scientific and media attention because of impacts of decreasing Arctic sea ice coverage on the Arctic climate, the Arctic ecosystems, and such individual species as the iconic polar bear. As a result, much attention has been given to each new overall record low in Arctic ice extents, these overall records typically occurring in September. This study systematically shows the record lows for all months, along with the record highs for all months, and does so for the full 37-year SMMR/SSM/I/SSMIS record. The results are striking, with the loss of ice in the Arctic throughout the annual cycle so strong that there have been no monthly record high Arctic ice extents for any month of the year since 1986 but 75 monthly record lows. The Antarctic results also show a sharp contrast, although less sharp and in the opposite direction, with 6 monthly record low ice extents since 1986 and 45 monthly record highs.

